

Indian Standard

**FUNCTIONAL REQUIREMENTS FOR WATER TENDER,
TYPE B FOR FIRE BRIGADE USE
(Third Revision)**

Fire Fighting Sectional Committee, CED 22

F O R E W O R D

Formal clause shall be added later on.

Water tender, Type B are used in towns or parts of town and industries where the fire risk is such that high rate of discharge of water is necessary for fire fighting and a high degree of maneuverability is also desired of the fire appliance at the same time.

This standard was first published in 1959 and revised in 1970 and 1980. The third revision is being based on the experience gained after publication of standard and availability of new designs and accessories. The revision includes provision of higher capacity of pump and water tank. Pump has been placed at the rear of appliance and coupling details have been incorporated. Provisions of water/foam monitor, telescopic light mast and alternator unit have been included in the revision. Details pertaining to body work, storage, pipe lines and valves have been elaborated.

A list of accessories and equipment which do not form part of this appliance and most of which are normally required to assist in operation of the appliance is given in Annex B for information and guidance.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

Indian Standard

FUNCTIONAL REQUIREMENTS FOR WATER TENDER, TYPE B FOR FIRE BRIGADE USE (Third Revision)

1 SCOPE

This standard lays down the requirements regarding material, design and construction, workmanship and finish, accessories and equipment of water tender, Type B for fire brigade use.

2 REFERENCES

The standards listed at Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated at Annex A.

3 GENERAL REQUIREMENTS

3.1 The appliance shall incorporate a high and low pressure fire pump of :

- a) 2000 LPM at 0.7 MPa and 300 LPM at 3.5 MPa capacity or
- b) 3000 LPM at 0.7 MPa and 300 LPM at 3.5 MPa capacity or
- c) 4000 LPM at 0.7 MPa and 300 LPM at 3.5 MPa capacity or

and a water tank of 4500 to 7000 litres capacity depending upon the type of chassis used. It shall carry an extension ladder and shall be capable of towing a trailer pump.

3.2 The water tender shall be fabricated in a manner so as to conform to the following characteristics:

a) Gross vehicle weight	Not less than 16,000 kg including crew, water and equipment.
b) Maximum speed on level road fully laden	72 km/h,
c) Acceleration from a standing start through the gears (fully laden)	64 km/h in 55 seconds,

d) The appliance shall be capable of being started from rest on a gradient of 1 to 4.	
e) When travelling at 48 km/h on a level dry surface the foot brake shall be capable of stopping the vehicle within a distance of 15 m from the point at which the brake is applied. The hand brake shall be capable of holding the fully laden appliance on a dry surface gradient of 1 in 4 when in neutral gear, and	
f) The appliance shall have the following overall dimensions:	
Wheel base	Not more than 4 500 mm
Turning circle	Not more than 20 m
Road clearance	Not less than 230 mm
Overall width	Not more than 2.50 m

NOTE — The chassis shall meet the prevailing emission norms and shall totally comply with the CMVR rules.

4 MATERIAL

4.1 The choice of material to be used in the construction of the appliance shall be made with a view to combining lightness with strength and durability. The following choice of materials shall be followed:

Pump casing and low pressure impeller	Lead tin bronze (Grade LTB 2 of IS : 318)
High pressure Impeller	Phosphor Bronze or Stainless steel
Impeller ring and impeller neck ring	Lead tin bronze (Grade LTB 2 of IS : 318)
Pump shaft	Stainless steel (Grade 04Cr18Ni10 of IS : 6603)
Pump panel	Aluminium sheets / chequered plates IS 737 or Mild Steel Sheets of IS 513

4.2 All parts which form water ways or come into contact with water shall be of stainless steel. All metal parts exposed to atmosphere shall either be of corrosion-resisting material or suitably treated to resist corrosion.

4.3 Lubricating nipples shall be provided wherever necessary.

5 DESIGN AND CONSTRUCTION

5.1 Engine

5.1.1 The engine shall be provided with cooling system to permit its continuous stationery running without overheating. Indirect cooling system shall be incorporated, if necessary, which shall be of the open circuit type discharging water to the waste. Arrangements shall be made to divert the cooling discharge water to water tank, if necessary.

5.1.2 The operating temperature of the engine cooling water shall preferably be thermostatically controlled.

5.1.3 The oil in the oil sump shall be prevented from overheating.

5.1.4 Suitable gauge for cooling water and glow lamp for lubricating system shall be provided in the driver's cab and on the pump panel. This shall be marked with operating temperature.

5.1.5 External filter shall be provided for the lubricating system and a tubular dip-stick to gauge the level of oil in the oil sump shall be provided.

5.2 Electrical System

5.2.1 A trickle type battery charger shall be provided for recharging the battery *in situ*. A red pilot lamp, indicating when the batteries are being charged from an external supply, shall be provided.

5.2.2 All important electrical circuits shall have separate fuses suitably indicated and shall be grouped into a common fuse-box located in an accessible position in driver's cab and fitted with means for carrying spare fuses. The wiring shall be single pole and shall not be exposed to the atmosphere. Conduits shall be used wherever necessary.

5.3 Water Tank — The capacity shall vary from 4500 to 7000 litres depending upon the type of chassis used. The tank body and baffles shall be of minimum 5 mm thick mild steel plates.

5.3.1 A tank of required capacity constructed out of mild steel treated for anti-corrosion shall be suitably mounted on the chassis in a manner keeping in view the proper load distribution on the axles.

A full length runner from behind the driver cabin till end of chassis frame shall be provided and made out of mild steel Channel of 100 x 50 x 5 mm suitably fixed to the chassis, frame with 6 mm thick mild steel plate and bolted to chassis frame wherever holes are available in the chassis frame and also with 16 mm 'U' bolts and nuts shall be nylock nuts only.

The tank shall be suitably baffled with minimum 2 numbers of baffles fitted longitudinally and 2 numbers baffles fitted transversely to prevent surge when the vehicle is breaking, cornering or accelerating.

The baffles shall be arranged in a manner to facilitate the passage of a man throughout the tank for cleaning purpose.

The tank shall be mounted on minimum three cross members to counter act the stresses caused by chassis flexion and shall be so secured that it can be easily removed. The water tank shall be provided with six chairs, three on either side for mounting the tank on the runner and chassis frame.

The water tank shall be fixed to the chassis frame and runner with 'U' clamps of 16 mm diameter with aluminum packing block and self-locking nuts.

Suitable eyes shall be provided on the shell of the tank to enable it to be lifted from the vehicle for repairs / replacement as and when required

5.3.2 The tank shall be fitted with a 50 mm bore overflow pipe. A 63 mm instantaneous hydrant connection, incorporating a strainer, shall be provided close to the pump panel control for filling the tank through 75 mm bore pipe work or feeding the hose reel equipment. Minimum 100 mm bore pipe line shall be taken from the tank to the suction inlet of the pump incorporating minimum 100 mm quick action spherical type valve. Separate valve(s) for performing the function given in **5.3.6** shall be provided to control the flow of water to the hose reel equipment. Drain plugs or drain cocks shall be provided wherever necessary.

5.3.3 The mild steel plates used for the tank shall be zinc plated or galvanized and shall be given adequate anti-corrosive treatment of epoxy treatment consisting of one coat of primer with two coats of finish after preparing the surface by sand blasting from inside and outside after fabrication if it is not galvanized. The open end of the overflow pipe shall be taken down to a point well below the chassis without affecting the effective ground clearance when fully loaded and shall discharge away from the wheels.

5.3.4 Dial gauge water level indicator for the tank shall be provided preferably in the driver's cab or a visual level gauge of the glass tube shall be provided at the control panel calibrated 1/4, 1/2, 3/4 and full (preferably calibrated in litres).

5.3.5 The tank shall have a bolted manhole of 450 mm diameter minimum and shall have a gun metal threaded ring and cap of 300 mm diameter for filling the water tank from the top. The manhole cover shall be made from 5 mm thick mild steel plate and epoxy coated from inside and outside. A cleaning hole of at least 250 mm diameter shall also be provided at the bottom.

5.3.6 The tank shall be connected with the pump and hose reel and valve(s) shall be provided in such a way that any of the following operations are possible:

- a) Hydrant - tank,
- b) Hydrant - reel,
- c) Tank – pump - high and low pressure hose reels,
- d) Hydrant – pump - low pressure hose reel, and
- e) Off.

5.4 Hose Reels

5.4.1 Normal Pressure - One hose reel (see IS : 884) shall be provided at the rear of the appliance with 60 m lengths of 20 mm bore hose in single length connected by screw 'C' type quick release couplings and terminating with a control branch and 5 mm nozzle. The reel shall be fitted with geared mechanism with suitable handle for easy rewinding.

5.4.2 High Pressure Hose Reels - Two high pressure hose reel to facilitate operation of the high pressure section of the fire pump shall be provided and mounted so as to be accessible for use from either side of the appliance. The hose shall be prevented from kinking. The hose shall be light weight PVC nylon braided hose and the working pressure of hose shall not be less than 4 MPa.

The high pressure hose reels shall hold not less than 60 m of hose in one length, terminating in high pressure fog/jet trigger type gun connected by quick connect couplings. The fog gun shall be made of stainless steel.

The inlet connection shall be of 20 mm and shall have a leak proof rotating type hose connector. The gun shall be of constant flow type and shall have a discharge capacity of 150 LPM approximately. Provision shall be made in the gun controls to achieve combat mode (straight jet) or a fog shield in split second. The gun shall have the ability to work on pressure for 2 to 4 MPa without affecting discharge pattern. The weight of the gun assembly shall not be more than 3 kg.

Plumbing between the pump and hose reel shall have clean and unobstructed water way of not less than 25 mm throughout.

5.5 Pump

5.5.1 A centrifugal high and low pressure pump shall be mounted at rear of the appliance. The low and high pressure sections of the pump may be either multi-stage or single-stage type. Anti-friction bearings external to the casing be provided so as to avoid any bearings within the pump casing. The gland shall be of the mechanical self-adjusting type.

The impeller/s of the low pressure section shall be closed type and shall be dynamically balanced. The impeller/s of the high pressure sections shall be closed or regenerative type. A drain cock plug shall be provided at the bottom of

the casing in a way to prevent the cock being opened due to vibrations. Studs, etc, used in the pump casing shall be stainless steel. The castings shall be without any blow holes, internal cracks, etc. The interior of the casting shall be smooth finished. The castings shall withstand the hydraulic pressure as given in **5.5.4**.

5.5.2 The pump shall be preferably completely covered. However, all the controls on the panel and the gauges shall be uncovered.

The pump shall be coupled to the prime-mover of the chassis through a power take-off capable of transmitting full torque of the engine used for the appliance. All propeller shafts and all fittings used for coupling the PTO, pump etc shall be of the same size and type as used by the chassis manufacturer for the drive line.

The PTO shall have a step up gear ratio of not less than 1:1.27. A cooling coil made of copper pipe shall be provided in the bottom of the PTO casing.

A control lever for engaging and disengaging the pump, with suitable locking devices, shall be provided in the driver's cab.

5.5.3 The pump shall be designed to give its rated output with an engine and pump input at shaft speed safe enough to operate the engine. The pump capacity shall be:-

- a) 2000 LPM at 0.7 MPa and 300 LPM at 3.5 MPa capacity or
- b) 3000 LPM at 0.7 MPa and 300 LPM at 3.5 MPa capacity or
- c) 4000 LPM at 0.7 MPa and 300 LPM at 3.5 MPa capacity

The design of the pump shall be such that the normal pressure and high-pressure stages can be operated simultaneously.

The pump housing shall have provision to connect normal pressure hose reel and cooling water line.

Simple mechanism shall be provided to change over from normal pressure to high pressure, preferably a single lever operation.

The pump shall give performance as given in Table 1, when working with strainers (except basket strainer) at $27 \pm 5^{\circ}\text{C}$.

Table 1 Pump Performance Data
(Clause 5.5.3)

SI No.	Output Litres/minutes	Pressure MPa	Lift M	Remarks
(1)	(2)	(3)	(4)	(5)
i)	2000 / 3000 / 4000	0.7	3	When working through two 2.45 m lengths of specified suction hose
ii)	1600 / 2400 / 3200	0.88	3	When working through two 2.45 m lengths of specified suction hose
iii)	720 / 950 / 1400	0.7	7	When working through 9.8 m, that is four 2.45 m lengths of specified suction hose
iv)	300	3.5	3	When working through two 2.45 m lengths of specified suction hose

5.5.3.1 Allowances for output

- a) One percent for every 2.5°C rise in water temperature,
- b) Four percent for every 300 m above mean sea level, and
- c) No allowance shall be made for humidity up to 75 percent. However, deduction at the rate of 1 percent of every 5 percent change in humidity shall be made when humidity changes from 75 to 95 percent.

5.5.4 Pump Test — The pump shall be run for a period of three hours non-stop delivering the rated output at 0.7 MPa and for one hour at 3.5 MPa with a lift of 3 m. During the test, the water shall not be replenished for the cooling system and the temperature of the engine oil shall not exceed 115°C or of the engine manufacturer rated temperature for continuous working whichever is less. The engine shall show no sign of stress during the test. The temperature of the cooling water (radiator water) tank shall not exceed 85°C. The PTO sump oil temperature shall not exceed 100 percent of the manufacturers recommended temperature for the grade of oil used. The pump casing and impeller shall be subjected to hydraulic pressure of 2.1 MPa to detect leakage, perforation, etc.

5.6 Suction Inlet and Delivery Valves

5.6.1 The Pump shall have suction inlet(s) having 100 - 150 mm standard suction connection (see IS: 902) with internal strainer(s) and blank cap(s). The strainer(s) shall be retained firmly when in use but shall be easily removable.

5.6.2 The pump shall be provided with two delivery valves for the 2000 LPM pump and 4 delivery valves for 3000 / 4000 LPM pump having 63 mm standard hose couplings (see IS : 903) with screwed wheel type quick closing clack valve (see IS : 4928). Blank caps fastened with chains and incorporating means to relieve pressure between the valve and the cap shall be provided one for each delivery valve. In the case of midship mounted pump, two / four delivery valves shall be provided at each panel.

5.7 Primer

5.7.1 The primer shall be capable of lifting water at least 7.0 m (measured from water level to the centre of pump) in not more than 24 seconds and shall preferably be fully automatic. The allowance shall be 300 mm for every 300 m elevation above mean sea level and 1 percent for 2.5°C rise in water temperature.

5.7.2 In the case of water ring type primer, means shall be provided to automatically disengage the primer when the pump is primed. Where required header tank complete with isolating valve enabling antifreeze solution to be used in the circuit. If the primer is of the reciprocating type, means shall be provided to automatically limit the speed of engine while the primer is engaged.

5.7.3 The primer shall be constructed of Gun Metal / light alloy casting, shall have stainless steel shaft and shall be fitted with suitable lubricated bearing depending upon the type of primer.

5.7.4 In the case of reciprocating type primer, the selection of materials shall be made with a view that no major part is required to be replaced in course of service and the material used for these parts shall be phosphor bronze and stainless steel depending upon their respective strength and use. The caps of primer and springs shall be properly secured. The primer lever shall be easily accessible from the operator(s) position.

5.7.5 In the case of reciprocating type, the primer shall be preferably designed with a view to prime when the pump is running at speed of 1 000 to 1 500 rpm.

5.7.6 In the case of Exhaust type, the primer shall be preferably designed with a view to prime when the pump is running at speed of 1 000 to 1 500 rpm.

5.8 Pipelines and Valves

5.8.1 All pipelines shall be of Stainless steel and all valves upto 5 mm size shall be 3 piece design stainless steel ball valves. All valves above 5 mm shall be standard butterfly valves.

5.8.2 All piping shall be sized so as to have minimum pressure drop and achieve the required pressure and flow at various locations.

5.8.3 All piping shall be seamless and designed for 10% over the maximum pressures encountered in the pipe.

5.8.4 The piping shall be flanged for ease of maintenance. However, flange joints shall be kept to minimum.

5.8.5 All lines shall be hydraulically tested at 1.5 times of the design pressure and pressure shall be held for two hours. In no case the lines shall be tested below 2.5 MPa.

5.8.6 All lines shall be suitably supported so as to provide rigidity and avoid vibrations.

5.8.7 All lines less than 5 mm size can be socket welded to matching rating fittings.

5.8.8 All lines above 5 mm size shall be butts welded with full penetration welds.

5.8.9 All bolts, nuts and washers used shall be of stainless steel.

5.9 Control Panel

5.9.1 Adequately illuminated control panel shall be provided and positioned as follows:

- a) *Rear mounted pump* — One control panel at the rear of the appliance.
- b) *Midship mounted pump* — Two control panels, one on each side of the appliance.

5.9.2 The control panel(s) shall include the following:

- a) Throttle control for engine;
- b) Pressure gauge — 0 to 2 MPa;
Pressure gauge — 0 to 5 MPa;
- c) Compound gauge calibrated as under:
 - Vacuum* — 0 to 75 cm Hg, preferably in black;
 - Pressure* — 0 to 0.6 MPa, preferably in black;
- d) Primer control (if the primer is not fully automatic);
- e) Gauge for cooling water and glow lamp for lubricating system; and
- f) Cooling water circuit control.

5.9.3 The following shall also be provided at a convenient position near the control panel(s):

- a) Water level indicator (see **5.3.4**),
- b) Control valve hydrant connection (see **5.3.6**).

5.10 Water / Foam Monitor - One water cum foam monitor shall be provided on the top at suitable location. The monitor shall conform to IS 8442.

5.11 Body Work and Stowage

5.11.1 Cabin

5.11.1.1 Enclosed accommodation for six persons shall be provided in the driver cab-*cum*-crew compartment including the driver and the in-charge of the crew. Both the seats shall be independent. The driver's seat shall be adjustable and comfortable. The rear compartment of driver's cabin shall have one removable seat for full width of cab for 5 (five) crew members. The cab floor shall be covered with 3 mm thick aluminium chequered plate rigidly fixed to the frame cross members by means of nuts and bolts or riveting. Trap doors for topping up oil etc wherever necessary shall be provided.

5.11.1.2 One roof light shall be provided in the driver's cabin dwell vision and external rear view mirrors shall be fitted to the cab.

5.11.1.3 The driver cum crew cabin shall be provided with full four doors, one for driver, one for officer and two at the crew compartment. The doors shall be generously sized for easy embarking / disembarking of crew members. All the doors shall be fitted on the super structural members, each hung upon three invisible coach type mild steel stout hinges and fitted with best quality handles.

5.11.1.4 The door handle on out side of driver seat shall have a locking arrangement. Other doors shall be lockable from inside. In addition to the doors locks, aluminum tower bolt of 20 mm shall be provided for all the doors from inside adequate grab rails shall be provided for easily boarding and alighting from the appliance.

5.11.1.5 The windscreen glass shall be provided in the two valves and shall be flat in shape. Each glass shall be fitted in E.P.D.M. rubber beading. The glasses shall be 5 mm thick toughened safety glass. The rubber beading used for fitting glasses and window frame shall be E.P.D.M. rubber.

5.11.2 Seats

5.11.2.1 The driver seat shall be adjustable type vertically, forward and backward. The officer seat shall be fixed type. Both the seats shall be rigidly fixed to the flooring by means of nuts and bolts. The seat cushion shall be of latex

foam rubber 75 mm thick upholstered in good quality foam leather cloth. The back seat shall be of latex foam rubber 50 mm thick upholstered in good quality foam leather cloth.

5.11.2.2 Below the crew seat, two lockers shall be provided. One for battery box to accommodate 12 volts 13 plates batteries – 2 numbers and another for keeping accessories. The extra length of battery cable shall be provided by tenderer.

5.11.2.3 The crew seat shall be rigidly fixed to floor by means of nuts and bolts, running full width of the vehicle suitable for sitting five fireman, covered with 75 mm x 50 mm cushion latex foam rubber upholstered in good quality foam leather of approved shade.

5.11.2.4 Below the crew seat, two lockers shall be provided, one for storage of batteries and another for keeping accessories. The extra length of battery cable shall be provided if required.

5.11.3 *Rear Body*

5.11.3.1 The rear body shall be fabricated in continuation and in line. The under frame crew members shall be fabricated from the rolled mild steel channel of 100 x 50 x 5 mm size.

The mild steel runner of 100 x 50 x 5 mm size shall be provided over the chassis member for the uniform distribution of load over the chassis. Each cross members shall be secured to the chassis frame by 16 mm diameter ‘U’ clamps with aluminum packing block and self locking unit. Balata packing of thickness 12 mm shall be provided in between the chassis frame and across members.

5.11.4 *Super structure*

5.11.4.1 The super structural of the cabin shall be constructed out of 2 mm mild steel 45 x 45x 20 mm pressed “TOP HAT” sections. The super structure shall be strengthened specifically on the members with the lockers doors frames are to be fitted and also the other members by providing brackets and gussets of 2 mm mild steel plate securely welded.

The details of super structure are as follows :

1	Under frame cross members	:	100 x 50 x 5 mm
2	Floor longitudinal members	:	50 x 50x 6 mm
3	Vertical members on even side	:	45 x 45 x 20 mm
4	Skirt member	:	45 x 45 x 20 mm
5	Waist member	:	45 x 45 x 20 mm
6	Top deck longitudinal	:	45 x 45 x 20 mm

5.11.4.2 The cab and lockers shall be of composite construction with sufficient rigidity and reinforcement and shall be kept as light as possible.

5.11.4.3 The structure/frame work shall be of welded constructions and made from 2 mm thick mild steel pressed sections and square tubes. The Angles and channels used shall be of minimum 3 mm thickness. The complete structure material shall be treated for anti corrosion by zinc plating. The plating thickness shall not be less than 20 microns. Two coats of Epoxy paint shall be applied to the completely welded structure.

5.11.4.4 The structure shall be so designed so as to avoid any vibration / ratting / deformation in the intended usage of the vehicle.

5.11.4.5 The interior paneling shall be done from 1.22 mm thick aluminium sheets and the exterior paneling shall be done from 1.60 mm thick aluminium sheets.

5.11.4.6 The entire roof of the vehicle, cabin floor and locker floor shall be covered with minimum 1.60 mm thick aluminium chequered plates. All the lockers sides and complete rear of the vehicle shall be covered with minimum 1.22 mm thick aluminium chequered plates.

5.11.4.7 Lockers shall be provided for secure stowage of all equipment given in **Annex B**. The height of the lockers from the bottom to the top of the opening shall be not less than 600 mm and the depth not less than 600 mm. All lockers shall be provided with internal automatic lighting arrangement with the master switch in the cab.

5.11.4.8 All lockers above chassis floor shall be covered with aluminium roller shutters. The roller shutters shall be made from extruded aluminium sections with suitable roller, spring, guide channels etc. All aluminium sections used shall be properly anodized. The roller shutters shall be rolled inwards underneath the roof giving unobstructed access to the equipment lockers and the fire fighting material. These roller shutters shall open in every position of the vehicle even in rough terrain. Guide rails shall support the shutters over entire length on both sides to make them absolutely torsion free. The roller shutters shall have a sturdy lock, preventing accidental opening during movement of vehicle. Roller shutters shall be made of hollow rectangular shaped aluminium links which shall be inter connected with rubber /plastic/ PVC profiles sealing the roller shutter watertight when closed. These roller shutters shall be durable, maintenance free, weather and corrosion resistant.

5.11.4.9 Suitable storage space shall be provided to store four 2.5 m lengths of suction hoses in convenient location.

5.12 Miscellaneous

5.12.1 A suitable bumper shall be provided at the rear rigidly fixed to the super structural members by means of nuts and bolts, fabricated from 100 x 50 x 5 mm mild steel channel.

5.12.2 Two cat ladders made out of stainless steel round or square pipe of 25 mm diameter shall be provided.

5.12.3 Two numbers of 25 mm diameter aluminum pipe railing with sufficient number of aluminum double socket brackets shall be provided to the rear body over the deck.

5.12.4 A heavy duty towing hook shall be provided and fitted the rear bumper by means of nuts and bolts.

5.12.5 Quick removable type wire mesh guard made from 25 mm X 25 mm size mild steel wire mesh of 1.6 mm covered in mild steel angle frame shall be provided to all the glasses of driver-cum-crew cabin.

5.13 Provision for Stowage of Equipments

For all water fittings like branch pipes etc., quick release type couplings are provided which enables the operator to locate the desired equipment instantly and thereby save valuable time at the time of fire. These couplings also ensure that none of the items damage the internal paneling and thereby increase the life of the vehicle. Suitable clamps, brackets, holders etc. are provided for all other items.

5.14 Cable Winch

An- electrically operated cable winch of 6 ton capacity shall be provided. The winch unit shall be complete with minimum 5.5 hp 12 V DC series wound electric reversible motor for increased pulling power, rope drum, and 27 m heavy duty galvanized EIPS wire rope with replaceable self locking clevis hook and shall be mounted on the front bumper of the vehicle with suitable strong supports.

5.15 Telescopic Light Mast

A compact, low profile, roof mounted lighting system, fitted with 4 X 1000 watts metal halide lamps, vertically elevated pneumatically upto 4.6 m shall be installed on the roof of the vehicle. Lighting shall be provided by a 12 V or 24 V DC with remote control, directional lighting system with rotation & tilt lamps to provide total coverage. The remote control unit shall allow a person to operate all the functions of the light mast & accurately aim for complete directional positioning. In addition auto-show, a one button command, automatically retracts, turns out the lights and stows the entire system to the compact transport position shall also be included in the remote controller.

The complete unit shall comprise of handheld remote control with cable, rotation and tilt positioner, mounting frame with built in tilt system.

5.16 Alternator Unit

A 6.5 KVA capacity portable diesel engine driven generator unit shall be mounted at suitable location with all necessary connections and control panel for providing power to the light mast as well as other electrically operated tools.

5.17 Ladder Gallows

Gallows shall be provided to carry a 10.5 m, aluminium trussed type extension ladder. The design shall be such that the ladder can be released without difficulty from a reasonably accessible position and shall embody rollers to permit easy withdrawal by one man. Means shall also be provided for locking the ladder when stowed.

5.18 Tool-Kit Container

A specially fitted recessed tray for the normal kit of tools, carried on the appliance, shall be provided.

5.19 Stability

The stability of the appliance shall be such that when under fully equipped and loaded conditions (but excluding crew), if the surface on which the appliance stands is tilted to either side, the point at which overturning occurs is not passed at an angle of 30 degrees from the horizontal.

6 WORKMANSHIP AND FINISH

6.1 All parts of the appliance shall be of good workmanship and shall have streamlined finish.

6.2 The appliance shall be painted fire red colour conforming to Shade No. 536 of IS 5. The paint shall conform to IS 2932.

7 INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT

7.1 Instruction Book or Books — Instruction book(s) for the guidance of the user(s), including both operating and normal maintenance procedure shall be supplied. The book(s) shall include an itemised and illustrated spare-parts list giving reference numbers of all the wearing parts.

7.2 Accessories

7.2.1 The following accessories shall be provided in addition to those normally fitted on modern commercial vehicles:

- a) *Fire bells* — 250 mm diameter fire bell shall be mounted externally and shall be capable of being operated from within the driving compartment. The bell shall be of the hand operated type.
- b) *Head lamps* — Two.
- c) *Fog lamps* — Two.
- d) *Reversing light* — Lamp suitably situated to assist reversing.
- e) *Amber blinkers lights* — Situated on the head of the driving compartment.
- f) *Trafficators* — Illuminated with indicating lights on instrument panel or in any other prominent position in driving compartment.
- g) *Wind screen wipers*
- h) *Tools* — All tools required for normal routine maintenance of the appliance which are not included in the kit for the chassis.
- j) *Siren* — Battery operated.
- k) *Search light* — Adjustable to give flood or beam light, mounted in a convenient position but capable of being readily disconnected and mounted on a tripod away from the appliance, complete with tripod and with not less than 30 m of TRS cable on a reel mounted on the appliance.
- m) *Spot light* — Adjustable, mounted in a convenient position on the near side of the driving compartment.
- n) *Inspection lamp* — Protected type on wander lead with plug. A socket shall be provided in the control panel in the driver's cab for plugging in the lamp.
- p) *Tail lamps* — Two of combined stop and tail.
- q) *Rear reflectors*
- r) *Cab, instrument panel and locker, light*
- s) *Public address system.*

8 MARKING

8.1 Each appliance shall be clearly and permanently marked with the following information:

- a) Manufacturer's name, or trade-mark, if any;
- b) Capacity of the pump in litres/minute, and of the water tank in litres; and
- c) Year of manufacture.

ANNEX A
(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
5:2004	Specification for colours for ready mixed paint (<i>fifth revision</i>)
273 :1990	Specification for picks and beaters (<i>fourth revision</i>)
318:1981	Specification for leaded tin bronze ingots and castings (<i>second revision</i>)
513:1994	Specification for cold-rolled low carbon steel sheets and strips (<i>fourth revision</i>)
617:1994	Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes (<i>third revision</i>)
636:1988	Specification for non-percolating flexible fire fighting delivery hose (<i>third revision</i>)
703 :1966	Specification for axes (<i>second revision</i>)
704 :1984	Specification for crow-bars and claw-bars (<i>second revision</i>)
737:1986	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (<i>third revision</i>)
841 :1983	Specification for steel hammers (<i>second revision</i>)
884:1985	Specification for first-aid hose-reel for fire fighting (<i>first revision</i>)
901:1988	Specification for couplings, double male and double female, instantaneous pattern for fire fighting (<i>third revision</i>)
902:1992	Specification for suction hose couplings for fire fighting purposes (<i>third revision</i>)
903:1993	Specification for fire hose delivery couplings, branch pipe, nozzles and nozzle spanner (<i>fourth revision</i>)
904:1983	Specification for 2-way and 3-way suction collecting heads for fire fighting purposes (<i>second revision</i>)
905:1988	Specification for delivery breechings, dividing and collecting instantaneous pattern for fire fighting purposes (<i>second revision</i>)

906:1988	Specification for revolving branch pipe for fire fighting (<i>third revision</i>)
907:1984	Specification for suction strainers, cylindrical type for fire fighting purposes (<i>second revision</i>)
910:1980	Specification for combined key for hydrant, hydrant cover and lower valve (<i>second revision</i>)
927: 1981	Specification for fire hooks (<i>second revision</i>)
952:1986	Specification for fognozzle for fire brigade use (<i>first revision</i>)
1084 :1994	Specification for manila ropes (<i>fourth revision</i>)
1931:2000	Engineer's files – Specification (<i>third revision</i>)
2097 :1983	Specification for foam-making branch pipe (<i>first revision</i>)
2171:1999	Specification for portable fire extinguishers, dry powder (cartridge type) (<i>fourth revision</i>)
2871:1983	Specification for branch pipe universal for fire fighting purposes (<i>first revision</i>).
2932:2003	Specification for enamel, synthetic, exterior (a) undercoating, (b) finishing (<i>third revision</i>)
3582:1984	Specification for basket strainers for fire fighting purposes (cylindrical type) (<i>first revision</i>)
4571:1977	Specification for aluminium extension ladders for fire brigade use (<i>first revision</i>)
4643:1984	Specification for suction wrenches for fire brigade use
4770:1991	Specification for rubber gloves for electrical purposes (<i>first revision</i>)
4927:1992	Specification for unlined flax canvas hose for fire fighting (<i>first revision</i>)
4928:1986	Specification for delivery valve for centrifugal pump outlet (<i>first revision</i>)
5098 :1969	Specification for cross-cut and rip saws
5131:2002	Dividing breeching with control for fire brigade use – Specification (<i>second revision</i>)

5612	Specification for hose-clamps and hose-bandages for fire brigade use
(Part 1): 1977	Hose clamps (<i>first revision</i>)
(Part 2):1977	Hose-bandages (<i>first revision</i>)
5714:1981	Specification for hydrant stand pipe for fire fighting (<i>first revision</i>)
6149:1984	Specification for single-ended open-jaw adjustable wrenches (<i>first revision</i>)
6603:2001	Specification for stainless steel bars and flats (<i>first revision</i>)
8423:1994	Specification for controlled percolating hose for fire fighting (<i>first revision</i>)
8442:1977	Functional requirements for stand post type water monitor for fire fighting
10245	Respiratory protective devices – breathing apparatus
(Part 2):1994	Open circuit breathing apparatus (<i>first revision</i>)

ANNEX B
(Clause 5.11.4.7)

SCHEDULE OF EQUIPMENT TO BE STOWED IN THE APPLIANCE

SI No.	Item	Quantity
1.	Aluminium extension ladder — 10.5 m (see IS 4571)	1
2.	a) Rubber lined delivery hose according to Type II of IS 636 in 22.5 m or 15 m lengths fitted with 63 mm delivery hose couplings (see IS 903) b) Unlined flax canvas hose according to IS 4927 in 30 m lengths fitted with delivery hose couplings (see IS 903) or Controlled percolating hose according to IS 8423 in 30 m lengths fitted with delivery hose couplings (see IS 903)	180 m 150 m
3.	a) Hose-clamps [see IS : 5612 (Part I)] b) Hose bandages [see IS: 5612 (Part I I)] c) Hose slings d) Hose straps	25 25 20 20
4.	Suction hose of rubber of 100 mm internal diameter in 2.5 m lengths fitted with 100 mm suction hose couplings (see IS 902)	10 m
5.	3 Way suction collecting head 100 m size (see IS 904)	1
6.	Suction wrenches for 100 mm suction coupling (see IS 4643)	2
7.	Suction strainer 100 mm size (see IS 907)	1
8.	Basket strainer (cylindrical type) (see IS 3582)	1
9.	Dividing breeching with control instantaneous pattern 63 mm (see IS 5131)	1
10.	Collecting breaching instantaneous pattern 63 mm (see IS 905)	1

11.	a) Hydrant — stand pipe — two way (see IS 5714)	1
	b) Double female coupling (see IS 901)	2
	c) Hydrant connection, 63 mm double armoured hose 1 m long with 63 mm female instantaneous pattern delivery couplings at both ends (see IS 901)	2
12.	Combined key for hydrant, hydrant cover and lower valve (see IS 910)	2
13.	Fog nozzle (see IS 952) with extension applicator with fog head	1
14.	Hand controlled branch for 63 mm size hose coupling	1
15.	Branch pipe, universal (see IS 2871)	1
16.	Branch with revolving head (see IS 906)	1
17.	Branch pipe (see IS 903)	4
18.	Nozzle of sizes 12 mm, 16 mm, 20 mm and 32 mm (two each) (see IS 903)	10
19.	a) Adaptor for 100 mm suction female screw coupling and 63 mm male instantaneous	2
	b) Adaptor double female instantaneous pattern 63 mm	2
	c) Adaptor double male instantaneous pattern 63 mm	2
20.	Nozzle spanners (see IS 903)	2
21.	Portable electric box lamp with rechargeable accumulator	2
22.	Hand lamp (torch — 4 cells)	2
23.	Flameproof lamp (usable in the presence of inflammable gases or vapours)	2
24.	Self-contained breathing apparatus (compressed air type) complete with spare cylinder and tool kit [see IS : 10245 (Part II)]	1 set
25.	Portable fire extinguisher, dry powder type, 2 kg (see IS 2171)	1

26.	Foam making branch FB-4 with pick up tube (see IS 2097)	1
27.	Lowering line — 50 mm hemp or terylene, 40 m long having two ends spliced in and one end with a running noose (see IS 1084)	1
28.	Long line — 50 mm manila, 30 m long (see IS 1084)	1
29.	Short line — 50 mm manila, 15 m long (see IS 1084)	1
30.	Canvas buckets	2
31.	First aid box for 10 persons	1
32.	Rubber gloves (in case) (see IS 4770)	1 pair
33.	Asbestos gauntlets (in case)	1 pair
34.	Axe, large (see IS 703)	1
35.	Spade	1
36.	Pick axe (see IS 273)	1
37.	Crow bar (see IS 704)	1
38.	Sledge hammer, 6.5 kg (see IS 841)	1
39.	Carpenter's saw, 60 cm (see IS 5098)	1
40.	Spanner, adjustable, 30 cm long handle (see IS 6149)	1
41.	Door breaker	1
42.	Hydraulic jack — 7.5 tonne	1
43.	Fire hook (see IS 927)	1
44.	Tool kit	1
45.	Grease gun	2
46.	Oil feeder	1
47.	Can oil — 2 litres	1

48.	Can oil	1
49.	Funnel for oil or fuel filling	1
50.	File bastard 30 cm (see IS 1931)	1